What is claimed is:

1. A method of compensating for phase noise added by a spectrum analyzer to measurements of phase noise of a signal under test (SUT) taken by the spectrum analyzer, the method comprising the step of:

applying a correction to a measured phase noise $\mathcal{L}(f_m)$ value for the SUT to determine an actual phase noise $\mathcal{L}_A(f_m)$ value for the SUT, wherein the correction comprises mathematically removing an added phase noise $\mathcal{L}_{SA}(f_m)$ value contributed by the spectrum analyzer from the measured phase noise $\mathcal{L}(f_m)$ value of the SUT.

2. The method of Claim 1 wherein the mathematical correction and the actual phase noise $\mathcal{L}_A(f_m)$ value is given by

$$\mathcal{L}_T(f_m) = 10\log\left(10^{\frac{\mathcal{L}(f_m)}{10}} - 10^{\frac{\mathcal{L}_{SA}(f_m)}{10}}\right)$$

wherein the term f_m is an offset frequency.

3. The method of Claim 1 further comprising the step of measuring phase noise $\mathcal{L}(f_m)$ values of the SUT at a plurality of offset frequencies f_m prior to performing the step of applying the correction.

4. The method of Claim 3 wherein the step of measuring comprises averaging a plurality of measurements of the phase noise $\mathcal{L}(f_m)$ values corresponding to each offset frequency f_m.

5. The method of Claim 1 further comprising the step of displaying the corrected actual phase noise $\mathcal{L}_A(f_m)$ data.

6. The method of Claim 1 further comprising the step of determining the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer at a plurality of offset frequencies f_m.

7. The method of Claim 6, wherein the step of determining comprises the step of extracting the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from data supplied by a manufacturer of the spectrum analyzer.

8. The method of Claim 6, wherein the step of determining comprises the step of extracting the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from added phase noise $\mathcal{L}'_{SA}(f_m)$ specification data for a class of spectrum analyzers to which the spectrum analyzer belongs.

9. The method of Claim 6, wherein the step of determining comprises the steps of:

generating a reference signal having a phase noise $\mathcal{L}_{ref}(f_m)$;

measuring a phase noise $\mathcal{L}_{ref}(f_m)$ value of the reference signal at each of the offset frequencies f_m with the spectrum analyzer; and

computing the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value at each of the offset frequencies f_m.

10. The method of Claim 9, wherein the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value is the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer.

11. The method of Claim 9, wherein the step of computing comprises subtracting a known reference signal phase noise $\mathcal{L}'_{ref}(f_m)$ value from the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value according to

$$\mathcal{L}_{SA}(f_m) = 10\log\left(10^{\frac{\mathcal{L}_{ref}(f_m)}{10}} - 10^{\frac{\mathcal{L}'_{ref}(f_m)}{10}}\right)$$

to yield the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer at an offset frequency f_m.

12. The method of Claim 9, wherein a carrier frequency of the reference signal approximately equals a carrier frequency of the signal under test.

13. The method of Claim 2 further comprising the steps of:

measuring the phase noise $\mathcal{L}(f_m)$ value of the SUT at a plurality of offset frequencies f_m; and

determining the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer at each of the offset frequencies f_m,

wherein the step of measuring and the step of determining are performed prior to performing the step of applying the correction.

14. The method of Claim 13, wherein the step of determining comprises the steps of:

generating a reference signal having a phase noise $\mathcal{L}_{ref}(f_m)$;

measuring a phase noise $\mathcal{L}_{ref}(f_m)$ value of the reference signal at each of the offset frequencies f_m with the spectrum analyzer, wherein the measured phase noise $\mathcal{L}_{ref}(f_m)$ value of the reference signal is the determined added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer.

15. The method of Claim 13, wherein a carrier frequency of the reference signal approximately equals a carrier frequency of the signal under test.

16. The method of Claim 13, wherein the step of determining comprises the step of extracting the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from data supplied by a manufacturer of the spectrum analyzer.

17. The method of Claim 13, wherein the step of determining comprises the step of extracting the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from added phase noise $\mathcal{L}'_{SA}(f_m)$ specification data for a class of spectrum analyzers to which the spectrum analyzer belongs.

18. A method of determining an actual phase noise of a signal under test (SUT), the method comprising the steps of:

measuring phase noise of a spectrum analyzer under reference conditions to obtain an added phase noise $\mathcal{L}_{SA}(f_m)$ value;

measuring phase noise of the SUT using the spectrum analyzer to obtain a measured phase-noise $\mathcal{L}(f_m)$ value; and

calculating an actual phase noise $\mathcal{L}_A(f_m)$ value of the SUT as a function of the measured phase noise $\mathcal{L}(f_m)$ of the SUT and the added phase noise $\mathcal{L}_{SA}(f_m)$ value.

19. The method of Claim 18 wherein in the step of calculating, the actual phase noise $\mathcal{L}_A(f_m)$ is given by

$$\mathcal{L}_A(f_m) = 10\log\left(10^{\frac{\mathcal{L}(f_m)}{10}} - 10^{\frac{\mathcal{L}_{SA}(f_m)}{10}}\right)$$

wherein the term $\mathcal{L}_A(f_m)$ is the actual phase noise value at an offset frequency f_m, and the terms $\mathcal{L}(f_m)$ and $\mathcal{L}_{SA}(f_m)$ are the measured phase noise value of the SUT and the added phase noise value of the spectrum analyzer at the offset frequency f_m, respectively.

20. The method of Claim 18, wherein the step of measuring phase noise of the spectrum analyzer under reference conditions comprises the steps of:

generating a reference signal having a phase noise $\mathcal{L}_{ref}(f_m)$;

measuring a phase noise $\mathcal{L}_{ref}(f_m)$ value of the reference signal at each of the offset frequencies f_m with the spectrum analyzer; and

computing the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer from the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value at each of the offset frequencies f_m.

21. The method of Claim 20, wherein the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value is the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer.

22. The method of Claim 20, wherein the step of computing comprises subtracting a known reference signal phase noise $\mathcal{L}'_{ref}(f_m)$ value from the measured reference signal phase noise $\mathcal{L}_{ref}(f_m)$ value according to

$$\mathcal{L}_{SA}(f_m) = 10\log\left(10^{\frac{\mathcal{L}_{ref}(f_m)}{10}} - 10^{\frac{\mathcal{L}'_{ref}(f_m)}{10}}\right)$$

to yield the added phase noise $\mathcal{L}_{SA}(f_m)$ value of the spectrum analyzer at the offset frequency f_m.

23. A spectrum analyzer apparatus that corrects for added phase noise contributed by the spectrum analyzer in measurements of phase noise of a signal under test, the apparatus comprising:

a signal conversion and detection portion that measures phase noise $\mathcal{L}(f_m)$ data of the signal under test;

a memory portion that provides data and information storage;

a controller portion that controls the signal conversion and detection portion; and

a compensation algorithm stored in the memory portion and executed by the controller portion, wherein the executed compensation algorithm applies a mathematical correction to the measured phase noise $\mathcal{L}(f_m)$ data of the signal under test, the correction comprising a compensation for the added phase noise $\mathcal{L}_{SA}(f_m)$ in the measured phase noise $\mathcal{L}(f_m)$ to produce actual phase noise $\mathcal{L}_A(f_m)$ data for the signal under test.

24. The apparatus of Claim 23 wherein the mathematical correction and the actual phase noise $\mathcal{L}_A(f_m)$ data is given by

$$\mathcal{L}_T(f_m) = 10\log\left(10^{\frac{\mathcal{L}(f_m)}{10}} - 10^{\frac{\mathcal{L}_{SA}(f_m)}{10}}\right)$$

where f_m is an offset frequency.

25. The apparatus of Claim 23, wherein the memory portion comprises the added phase noise $\mathcal{L}_{SA}(f_m)$ data that is used by the compensation algorithm.

26. The apparatus of Claim 25, wherein the added phase noise $\mathcal{L}_{SA}(f_m)$ data is measured by the signal conversion and detection portion.

27. A system for compensating for phase noise added by a spectrum analyzer from phase noise measurements of a signal under test (SUT), the system comprising:

a spectrum analyzer that measures phase noise $\mathcal{L}(f_m)$ data of the signal under test; and

a controller that mathematically corrects the phase noise $\mathcal{L}(f_m)$ data of the SUT measured by the spectrum analyzer to produce actual phase noise $\mathcal{L}_T(f_m)$ data for the SUT.

28. The system of Claim 27, wherein the controller comprises a control algorithm that mathematically removes added phase noise $\mathcal{L}_{SA}(f_m)$ data contributed by the spectrum analyzer from the measured phase noise $\mathcal{L}(f_m)$ data of the signal under test.

29. The system of Claim 28, wherein the controller further comprises:

a memory;

a central processing unit (CPU), wherein the control algorithm is stored in the memory and executed by the CPU; and

an input/output interface that interfaces with the spectrum analyzer,

wherein the executed control algorithm receives the measured phase noise $\mathcal{L}(f_m)$ data for the SUT from the spectrum analyzer using the interface, and wherein the control algorithm implements

$$\mathcal{L}_T(f_m) = 10\log\left(10^{\frac{\mathcal{L}(f_m)}{10}} - 10^{\frac{\mathcal{L}_{SA}(f_m)}{10}}\right)$$

to compensate for the added phase noise $\mathcal{L}_{SA}(f_m)$ data contributed by the spectrum analyzer from the measured phase noise $\mathcal{L}(f_m)$ data of the signal under test to produce the actual phase noise $\mathcal{L}_A(f_m)$ data for the signal under test, where f_m is an offset frequency.

30. The system of Claim 29, wherein the executed control algorithm further controls the spectrum analyzer using the interface during a phase noise measurement of the signal under test.